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ANALYSIS OF HSP70 GENE EXPRESSION IN *BIOMPHALARIA ARABICA* AFTER EXPOSURE TO CADMIUM.

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ABSTRACT

Specific amplification of nucleic acid fragments by reverse transcription-polymerase chain reaction technology (RT-PCR) has been recently employed to analyze gene expression under various cellular conditions. Here, the heat shock protein 70 (HSP70) mRNA level was evaluated in *Biomphalaria arabica* at lethal and sublethal levels of cadmium over 336 hr. Polyadenylated RNA was extracted from snail tissues and HSP70 gene expression was analysed using quantitative RT-PCR. Results were expressed in arbitrary units as a ratio of optical density of HSP70/β–actin electrophoretic bands. HSP70 gene expression was 0.84 ± 0.020 for control, 1.32 ± 0.042, 2.565 ± 0.061 and 2.75 ± 0.069 for cadmium-stressed snails at 1, 2 and 3 mg/l, respectively. This suggests that disruption of cell stress gene expression may be a useful bioindicator to detect water toxicants, such as cadmium, before a full-blown toxic response.

INTRODUCTION

Cadmium is considered to be a serious lethal occupational and environmental toxin (Ostrowski *et al.*, 1999). Recently, it was ranked number 7 among top 20 Hazardous Substances Priority List of the Agency for Toxic Substances and Disease Registry/Environmental Protection in 1997 (Ostrowski *et al.*, 1999). The metal is introduced to the environment from industrial wastes such as nickel-cadmium batteries, pigments and through smelting of ores and burning of fossil fuels (Aylett, 1979). Humans are continuously exposed to high levels of cadmium and accumulate the metal throughout their lives in the kidney, liver, brain and lung tissues, which may lead to neurological disorders and development of cancer (Bernard and Lauwerys, 1986). For these reasons, a great emphasis is put on the development of new techniques for monitoring environmental cadmium toxicity.

In this respect, fresh-water molluscs, which are widely distributed over 600 localities within seven regions covering Saudi Arabia (Brown and Wright, 1980; Siddiqui, 1981), may represent a good choice for use as a biomarker to detect exposure to water toxicants before a full–blown toxic response.

In particular, changes in the expression of cell stress or the so-called heat shock genes, may be considered as a biomonitor to assess whether organisms are experiencing cellular stress within their environment. Such